## DEPARTMENT OF AGRICULTURE, CEYLON.

BULLETIN No. 39.

# THE DISTRIBUTION OF XYLEBORUS FORNICATUS, Eich.

(Shot-hole Borer of Tea.)

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Entomologist for Shot-hole Borer Investigations.

Peradeniya,

August, 1918.

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H. C. COTTLE, GOVERNMENT PRINTER, CEYLON.

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(Shot-hole Borer of Tea.)

### 1.—HISTORY IN CEYLON.



HE description of the Shot-hole Borer Beetle (Xyleborus fornicatus) was made by Eichoff\* in 1868 from a specimen collected in Ceylon. Though not impossible, it is yet improbable that Eichoff's specimens were found attacking the tea bush.

Though tea existed in the Island at the time, the range of the plant was confined to a few examples in the Botanic Gardens and some acres newly planted on the Loolecondera estate (Lower Hewaheta district). From correspondence between Mr. E. E. Green and Mr. G. Alston, it is quite certain that the insect was present on the Craighead estate, Nawalapitiya (Dolosbage district), in 1892. Specimens were sent by Mr. Alston to Dr. Trimen in 1893, and on January 23 of that year Dr. Trimen answered as follows:—

They are well-known little beggars, closely allied to the apple twig berer at home (i.e., Xyleborus dispar). I do not think his work leads to any very great damage in the tea plants, but if he came in great numbers he might do considerable harm. I know this little borer on four estates near here (Peradeniya) myself: in one case he disappeared to a large extent; in the other cases he is spreading, but as yet has done no very serious damage.

From a later letter from Mr. Alston the pest was first noticed in January, 1892, Field 26 A, but it was evidently on the estate before that time.

In April, 1896, the following article by Mr. Edward Barlow appeared in Indian Museum Notes, Vol. 1V., No. 2, pp. 56-58, with a drawing of the insect (pl. V., fig. 2), containing an extract of Mr. Alston's letter to Mr. Green dated January 8, 1895:—

On January 28, 1895, specimens of a small beetle, together with pieces of tea stems riddled by them, were sent to the Indian Museum through Mr. E. E. Green, of Ceylon, from Mr. G. Alston, superintendent of tea estate, Craighead, Nawalapitiya. The insect proved on examination to belong to a species of Scolytid beetle, which has not previously been reported to attack tea plants in India. Specimens

<sup>\*</sup> Berl. Ent. Zeitschr., p. 151, 1868.

were therefore forwarded to Mr. W. F. H. Blandford, who very kindly examined them and identified them as belonging to the species Xyleborus fornicatus, Eichoff, a form closely allied to the often destructive species Xyleborus dispar of Europe and North America.

The following is an extract from a letter furnished by Mr. G. Alston .-

The pest appears mostly in patches, but has spread very considerably since I first observed it in any numbers three years ago. There is no evidence of any previous disease in attacked trees. Most of the trees attacked show no outward sign of the pest, except when almost every branch is attacked, when they turn rather yellow, and stop flushing Young trees about two years old, before they are topped, often snap off at the spot where the borers have made holes for their entrance or exit. Strong vigorous trees in good soil seem to be very little affected by it, and throw out good red wood even from badly bored stems. On the other hand, poor plants on ridges or poor soil seem naturally to feel the effect of it quickly, though in no case have I seen a tree killed by it. Isolated branches die off, but new branches come out in their places. As a rule, you can only tell an attacked tree (except in the case of young plants, when the stems snap off) on pruning it, when the holes in the wood are very apparent. It (the beetle) does not attack the cut surface after pruning, but makes its entrance through the bark. In the case of young red wood, it very generally goes straight down the pith; in older branches I have often seen the wood riddled, as if a charge of snipeshot had been fired into it, with only one or two minute holes in the bush for exit or entrance. And yet, in the case of vigorous trees, they seem to thrive notwithstanding. Since 1893 the pest has spread very much and become more general, though I cannot say that I see much difference in the fields that were attacked then.

The writer, in the foregoing account of the pest, practically suggests the remedy, namely, either not to plant in poor soil, or, if the soil is poor, to improve it, and then to strengthen the plant against attack. the great object of all medical treatment everywhere.

To prevent the spread of the disease, the affected branches should be cut off and burnt.

The next record of the pest comes from Attabagie estate, Gampola (Pussellawa district), in 1899, and further records are as follows :-Post Town

District

Estata

Estate.	rost lown,		District.
1900. Pen-y-lan	Dolosbage		Dolosbage
1901. Augusta Hindugalla Deltota	Peradeniya do. Deltota	••	Hantane
1903. Kadawella Deaculla Poonagalla Tonacombe Hauteville Halgolle Kotuwegedera Midlands	Watawala Koslanda do Namunukula Agrapatana Yatiyantota Matale		Lower Dikoya Haputale do, Badulla Dimbula Kelani Valley
Ury	Passara Knuckles and	 Kelel	Passara bokka

This gives evidence that in 1903 the insect was already distributed in a number of widely separated districts, and by 1909 estates in Maturata and Wattegama were added. Since 1912, when the Rangala and Medamahanuwara districts were reported, the range has extended to Balangoda, Ratnapura, Galle, Kalutara, Madulsima, Kegalla, and a few estates in Upper Dikoya.

The record in 1903 from Hauteville, Agrapatana, is of especial interest, as the estate lies in the middle of a large uninfected area. There can be no question of the identity of the specimens, which are still in the Department of Agriculture.

Inquiries show that Shot-hole Borer was found attacking about half an acre of tea on the Glasgow boundary in August, 1903; the infected portion was pruned, and all the prunings were burnt; this information comes from Mr. Jackson, who was then a superintendent on the estate. The borer has not re-appeared here or on any neighbouring estate in the Dimbula district.

Quite recently there has been a considerable spread in the Ratnapura and Balangoda districts, both of which may now be taken generally as completely infected, except for some outlying and isolated estates. Here the infection undoubtedly started from the planting of infected tea plants brought from the Ambegamuwa and Lower Hewaheta districts in 1910 on a new clearing of 47 acres. Since 1914 the borer has covered an approximate area of 5,000 acres in the district.

It is a great mistake to suppose that all areas where tea is grown in Ceylon are affected by Shot-hole Borer. Haputale West, New Galway, Nuwara Eliya, and Uda Pussellawa, where the borer is entirely absent, represent an area of 15,000 acres alone; while in Upper Dikoya, Dimbula, Madulsima, and Maskeliya about 90,000 acres are still uninfected. The total area uninfected is about one quarter of the total acreage under tea.

The list of infected estates at the end of this Bulletin serves to give a good general idea of the distribution of the pest. The most interesting point is the limitation of the distribution at certain places in well-marked valleys. In Dimbula the infestation comes to a somewhat abrupt end on the East Holyrood and St. Andrew's estates, and it seems likely that the insect is from time to time blown from the lower portion of the valley (Mcddecombra) to the latter estate, but never becomes properly established there. Similar instances are afforded in the cases of the Rozelle-Hatton valley (Lower Dikoya), and the lower elevations of Upper Dikoya and Maskeliya. The Maha Uva estate lies between the Walapane and Uda Pussellawa districts, and the lower portion has been

somewhat heavily infected since 1915. Being isolated from the large uninfected Uda Pussellawa district by jungle and patana, an opening of the intervening land might be a menace to the latter district.

There can be little doubt that wind and the planting of new clearings with infected tea plants have been in great part the factors in the distribution of the insect.

Distribution by natural causes appears to spread the insect much less rapidly than distribution in infected plants.

### 2.—DISTRIBUTION IN CASTOR OIL TREE.

Mr. E. E. Green collected Shot-hole Borer in castor oil tree (Ricinus communis) from Hanguranketa in July, 1906, and the late Mr. A. Rutherford recorded it in this plant from Peradeniya in 1914. Until 1915 it was not realized to what a large extent the tree was attacked, and it may now be said that, in the red variety of the plant, the insect has been found from sea level to an elevation of 6,000 feet. The habit of the insect, when boring in this tree, gives evidence that castor oil tree is the true host plant; and this is further corroborated by the distribution outside Ceylon, and by the fact that the tree is infested in Cevlon in areas very far removed from any tea. There is some reason for believing that the tea on one or two estates has been infected directly from this plant, and the case of the Hauteville estate, mentioned above, possibly throws light upon the matter, as castor oil trees have long been in the Dimbula district, and, before their removal, were breeding many millions of insects.

#### 3.—Distribution outside Ceylon.

In August, 1917, specimens of castor oil tree were received from Bangalore, India (elevation 3,000 feet), riddled by true Shot-hole Borer. These were collected and sent by the Government Entomologist, Coimbatore; there were some hundreds of insects in the sections of the tree received. This is the only authentic record of the insect outside Ceylon.

Inquiry has been made into several other records, and in each case it will be seen that there is grave doubt of the identity of the insect:—

Watt and Mann, "The Pests and Blights of the Tea Plant," p. 175, 1903:—

Xyleborus fornicatus, Eichoff.—Till the autumn of 1900 it (the beetle) was unknown in India, but then suddenly appeared and did considerable damage on a garden in the Upper Dibrugarh district before its nature was discovered and measures were taken to deal with it. One of the authors has since found it in a second place in Upper Assam, again doing considerable damage.

Description and Depredations.—The insect is a small beetle, rarely more than one-eighth of an inch in length, which is found riddling the branches and stems of the bushes, both as a grub and in the mature condition. The extremely small size of the beetle often prevents its recognition, until a very large patch of the tree has been attacked and seriously affected.

When first reported in India, the manager of the estate on which it occurred described the plot affected as a piece of pure Assam indigenous tea, and then went on to say, "the affected part looked at first as if it had been struck by lightning, a number of bushes turning red and then dying off completely. No notice was taken of it until it was seen to be spreading, when, on close examination, powdered wood was noticed round the affected bushes, and small holes in the stem a few inches above the ground. On the stems being split open, a number of bettles and grubs were found to be inside, and to have tunnelled the stem in all directions, but only for about 6 inches in height, and in every case just above the ground."

It will be seen that the description here given is entirely different from that correctly recorded in the Indian Museum Notes of 1896. Therefore, it must be assumed that the insect here described belongs to another species. *Syleborus semiopacus*, Eich., and *Xyleborus perforans*, Woll., have both been recorded from tea in Ceylon, but from bushes previously killed by some fungus disease. The description given by Watt and Mann strongly points to the bushes having first been killed by some agency other than an insect. In a letter dated January 22, 1917, Dr. Mann says:—

The samples of Xyleborus fornicatus which I reported in "Pests and Blights of the Tea Plant" were identified by Dr. George Watt from samples sent to him by Mr. Green from Ceylon. They came from the Pobbajan Tea Co., and the whole patch where they occurred was at once burnt and cut down to the ground. They were never found again in my time, either there or anywhere else. The samples, if they still exist, are with the rest of Sir George Watt's collection of tea pests and blights. Where these were sent to I do not know. They may be with the Imperial Entomologist, Pusa.

Further inquiries show that the specimens were preserved on slides in the Indian Museum, but had become detached and lost.

With regard to the second place in Assam from which the insect was recorded, there appears to be no record whatever.

It can only be assumed that there was here some mistake in identity, and the specimens, though compared with samples from Ceylon, were never determined by any authority on Scolytid bectles. The record is copied in Leffroy's "Indian Insect Life," p. 395. Specimens received from Assam in tea were all species different from X. fornicatus, but species which might be confused with that insect.

Bainbrigge Fletcher, "Some South Indian Insects," 1914, pp. 345-346:—

Xyleborus fornicatus, Eich.

Distribution: Travancore (Pirmad and High Range).

Status: The Shot-hole Borer is said not to be uncommon in Travancore, and presumably does little damage.

Remarks: I am indebted to Mr. Anstead for information regarding the occurrence of this insect in Southern India.

The record was made on the authority of Mr. R. Anstead, Deputy Director of Agriculture, Bangalore.

In a letter dated August 30, 1917, he says :-

I think it is extremely probable that X. fornicatus does not occur in South India. I have a note that I found what I then thought to be this insect in 1910 in Peermade, and am responsible, I know, for telling you this (in a previous letter); but in view of what I now know of this insect, and that I cannot find it again or hear of it from any teaplanter, I think I made a mistake, and mistook some other pest for Xyleborus. At any rate, if it does occur, it is very rare, and not a pest.

M. Hagedorn, "Der Tropenflanzer," Berlin, XVII., No. 4, April, 1913, p. 215:—

Two Scolytid beetles have been destructive to nutmeg (Myristica fragrans) in Penang, Xyleborus fornicatus, Eichoff.

Hagedorn, the Scolytid authority, gives the record, and refers to specimens from cacao in Ceylon in No. 3 (March, 1913, p. 154) of the same journal. Here, however, though stating that the insect is found in cacao and tea in Ceylon, he does not refer to the Penang record in the later number. Of the many trees and plants attacked by X. fornicatus in Ceylon, the nutmeg does not appear amongst them, though another species of Scolytid is common in the fruits (Coccutrupes).

E. A. Andrews, "Quarterly Journal, Scientific Department, Indian Tea Association," Part IV., 1913, pp. 94 and 95.

Under the heading Shot-hole Borer, Xyleborus fornicatus, a description of the habits is given, which, if applying to the species, is so inaccurate that it is certainly not worth quoting.

The locality in which the observations were made is not given, and the remedial measures, "by placing upright poles in the ground among the bushes, the insects may be induced to leave the latter alone and bore into the former, which can be destroyed," have obviously been suggested by one who has no knowledge whatever of the insect.

The Entomologist at the Tocklai Experiment Station, Assam, amongst other valuable information, says that "Antram recorded X. fornicatus from Romari tea estate,

Assam, but when I was there in 1915 I found that the damage which he had attributed to a Scolytid was caused by a small

Psychid (Lepidopterous) caterpillar."

In conclusion, it may be said that, owing to the knowledge of the true Shot-hole Borer as a pest in Ceylon, authorities in India have recorded this insect in that country on the slenderest ground, and the fact that no specimens of X. fornicatus are available from India for identification, except in the one authentic case from Bangalore in castor oil tree, gives legitimate cause for assuming that the insect does not exist in tea either in India or Assam.

It is possible that Hagedorn's record from Penang in nutmeg

is valid, but no details of any kind are available.

According to the "Review of Applied Entomology,"
Vol. IV., p. 136, Mr. C. F. C. Beeson, in the "Indian Forester,
Allahabad," XLII., No. 4, April, 1916, pp. 216-223, records X, fornicatus from the sal tree (Shorea robusta), but the Forest Zoologist, Dehra Dun, writes on September 4, 1917, "I have seen no specimens of X. fornicatus from India."

The distribution of Xyleborus fornicatus, Eich., is as follows:-

Plant.		Elevation
India (Bangalore).		Fcet.
Ricinus communis L. Castor Oil Tree		3,000
Penang,		
Myristica fragrans Houtt. Nutmeg		?
Ceylon,		
Albizzia moluccana Mig.		100-3,000
Allophylus cobbe	• • • • • • • • • • • • • • • • • • • •	1,600
Bixa orellana L. Annatto	.,	?
Camellia theae Link. Tea		100-5,000
Caryota urens L. Kitul Palm		4,000
Cassia alata L.		1,600
Cinchona calisaya Wild. Cinchona		7
Citrus aurantium L. Orange		2,000
Clerodendron sp.		1,600
Crotalaria striata		2,000
Desmodium cephalotes		1,600
Erythrina lithosperma Bl. Dadap		1.600-4.500
Grevillea robusta A. Cunn. Silky Oak		1,600-4,000
Hevea brasiliensis Mull. Para Rubber		1,000-2,000
Jungle Shrubs and Lantana		1,000-4,000
Melastoma malabathricum L.		1,000
Persia gratissima Gaertn. Avocado Pear		1,600
Petraca volubilis Jaco		1,600
Photinia japonica Linell. Loquat		3,000
rsigium guyaya. Guaya		9
Micinus communis L. Castor Oil Tree		100-6,000
rephrosia candida D. C. Boga Medalloa		1,000-4,000
1ephrosia vogelii		1,600
Terminalia catappa L. Country Almond		1,600
Theobroma cacoa L. Cocoa		1,600

Of these plants, only three harbour the insect to any great extent, namely, castor oil tree, tea, and country almond, if

the identification is correct in the latter case.

Species of Crotalaria, Tephrosia, the Dadap, and Albizzia may occasionally be seriously attacked. In the other plants galleries are only made with varying success. In the case of the country almond, portions of wood attacked by fungus, but otherwise living, have been infested; in all other cases living tissue is entered. Jungle shrubs are only entered in close proximity with heavily infected tea.

### 4.—ELEVATION.

The elevation of the Craighead estate is about 2,000 feet above sea level. It is at this elevation that Shot-hole Borer is now particularly abundant. In 1903 the insect was certainly established at elevations of about 4,000 feet. There does not seem to be much doubt that Shot-hole Borer spreads gradually upwards, attaining an altitude of 5,000 feet, but it becomes less common when 4,000 feet is reached, and above 4,500 it is no longer a scrious pest.

The intervals at which tea is pruned certainly influence the infestation at given altitudes, and if tea can be run so that a vigorous flush can be plucked for longer periods, the infestation is less than that at a similar altitude, where the tea flushes for shorter periods, entailing shorter periods between prunings.

The reason for the borer being less common at elevations above 4,000 feet is that the development is longer by a period of some three weeks, as compared with that at 2,000 feet or under. At very low elevations, 100–1,000 feet, the insect, curiously enough, becomes again less abundant. The districts of Galle and Kalutara, which afford examples, are, however, extremely wet, and this may in part account for the marked falling off in the infestation.

6('			List of Estates Infected (to June 7, 1918).	Infected (	to June	3 7, 1918).		1	(
7)18	District.	Naro or	Name of Estate or Division.	Group.	ď.	Post Town.	Date of Registration.	3	Gazette No.
Aingala (s.	Alagala (see Kadugannawa North).	a North).				:	1	•	700
Ambagamuwa	· ·	Arslena	:	:	i	. Nawalapitiya	. Nawalapitiya June 29, 1917	•	0,384
		Ashbourne		:	ı	do.	February 5, 1915		180
		Atherton (see	Atherton (see Rotmale district)				MIOI OF Jone M.	9	8 705
		Blackstone		Midland	nd	; }, !	March 19, 1910		0,00
		Blackwater	:	:	!	Nawalapitiya	Februar	٠	100
		Bridgend	:	:	ı	do.	do.	:	do.
		Dahanaike	:	· · Penrhos	801	Galboda	do.		go.
		Ellawala	:	:	1	do.	September 10, 1910		0,023
		Gallebodde	:	Gallet	Gallebodde	qo.	February 5, 1915	•	6,697
		Glenfern	:	Glenfern	rn.	. Nawalapitiya	:	:	do.
		Gneiss Rook	:	Midland	nd.	op.	March 19, 1915	:	3,705
		Green Haves	:	:	1	do.	June 29, 1917	:	6,884
		Hangranova	:	:	1	do.	February 5, 1915	:	6,697
		Hentlev's	:	Penrhos	so	Galboda	do.	•:	do.
		Hyndford	:	:		Nawalapitiya	do.	:	do.
		Imboolpittia	:	:	1	. <b>d</b> o.	do.	:	do.
		Katawala	:	:	· 	. Galboda	January 12, 1917	:	6,847
		Kenilworth	:	Midland	nd Tal	op .	March 19, 1915	:	6,705
		Mastnawatte	:	Galbodde	dde .	do.	February 5, 1915	:	6,697
		Midland	:	:	do.	. Nawalapitiya	March 19, 1915	:	007,
		Penrhos	:	Penrhos	. 80	. do.	February 5, 1916	:	6,697
		Prestonsland	:	Midland	nd	. do.	March 19, 1915	9	,705
		Rondura (see	Rondura (see Kelani Valley).						
		St. Clive (see Yakdessa)	Yakdessa).			5	dn.	:	do.
		Strathellie	:	:		Galboda	February 5, 1915 6,697	9	697
		Way werename	:	:			•		

( 9 )

District.	Name of Este or Division.	Name of Estate or Division.	Group.	Post Town.	Date of Registration.	Gazette No.
dulla	Angodde Attampettiya	::	Cobo Cobo	Badulla do.	May 14, 1915 June 7, 1918 Mey 14, 1915	6,713 6,948 6,713
	Ballagalia	::	Glen Alpin Cobo	do.	do.	do.
	Craigmore	:	1	Haliela	Money of 1917	do
	Cullen Debedde	::	Wewesse	baduna do.	May 14, 1915	6,713
	Dewatura	:	Tonacombe	Namunukula	June 7, 1918	6,948
	Dotlands		Sarnia	Datuma	June 7, 1918	6,948
	Ellawattie	: ;	1	Demodera	May 14, 1915	6,713
	Elmshurst		Tonecombe	Badulla Nammnikula	June 7, 1918 do.	do.
	Galanitskanda	::		do.	February, 2, 1917	6,851
	Glen Alpin	::	Glen Alpin	Badulla	May 14, 1915	6,713
	Gowerakelle	:	:	Demodera	February 5, 1910	6,713
	Hindagalla	:	1 1	Badulk	March 19, 1915	6,705
	Jaimideen	: :	::	Haliela	December 11, 1914	6,687
	Kalugalla	:	Tonacombe	Namunukula	June 7, 1918	6,948
	Kandahena	:	:	do.	July 30, 1915	0,730
	Keenakelle	:	Keenakelle	Badu	October 12, 1914	6 705
	Kottagodde	Doccora)	Spring Valley.	y do.	March 19, 1910	0,100
	Mahatenne	(	Sarnia	do.	June 7, 1918	6,948
	Moragalla	:	:	do.	June 1, 1917	6.705
	Nahavilla	:		Demodera	Angust 3, 1917	6,890
	Narangalla Navilla	:::	Demodera	Badulla	May 14, 1915 December 17, 1915	6,713

Badulla ..

Ootumbe	:	Demodera	:	Demodera .		May 14, 1915	6,713
Pingarawa	: :		. :	Namunukula .		May 14, 1915	6.713
Queenstown	:	ı	•	Bedulla		September 10, 1915.	6,739
Ravenswood	:	]		Namunukula	:	May 14, 1915	6,713
Rockhill	:	Glen Alpin	:	Badulla	:	do.	do
Sarnia	:	Sarnia	:	do.	:	June 7, 1918	6.948
Serendib	:	1	:	do.	:	September 15, 1916.	6.823
Southam	:	Demodera	:	Demodera	:	February 5, 1915	6,697
Spring Valley, IV.	:	Spring Valley		Badulla	:	March 19, 1915	6,705
St. James	:	. 1	:	Haliela		May 14, 1915	6.713
Stratheden	:	1	:	Demodera	:	February 22, 1918	6.926
Telbedde · · :	:	i	:	Badulla	:	March 19, 1915	6.705
Tonscombe	:	Tonacombe	:	Namunukula	:	June 7, 1918	6,948
Unugalla	:	I	:	Badulla	:	June 1, 1917	6.876
Westmorland	:	İ	:	do.		March 19, 1915	6,705
Wewesse	:	١	:	do.		May 14, 1915	6,713
Weyvelhena	:	Demodera	:	Demodera .		do	do.
Yelverton	:	1	:	Badulla.	:	June 7, 1918	6,948
Alupolla (see Ratnapura district	یہ						
Cecilton	:	Balangoda	:	Balangoda	:	June 7, 1918	6.948
Denegama	:	1	:	Bogawantalawa		September 15, 1916	6.823
Detenagalla	:	Balangoda	:	Balangoda.		July 30, 1915	6,730
Keenagaha-Ella	:	.	:		:	June 18, 1915	6.722
Keppoch	:	1	;	do.		March 9, 1917	6,858
Maratenne	:	Balangoda	:	do.		June 7, 1918	6,948
Meddakande	:	Meddakande	:	do.		do.	do.
Pambagolla	:	Balangoda	:	do.		July 30, 1915	6,730
Pinnawela	:	do,	:	do.		June 7, 1918	6,948
Rasagalla	:	1	:	do.		June 29, 1917	6,884
Wallawe	:	i	:	do.		July 20, 1917	888
Wewelwatte (see Ratnapura district)	riot).						

							(	J	2		)											
Gazette No.	6,697	6,739	6,697	do.	6,823	do.	9 9	do.	do.	6,909	6,697	3	6,895	6,749	do.	6,948	6,739	6,697	do.	do.	6.697	do.
	: :	20	: :	: :			: :	:	٠,		:	:	:	:	: :	:	G	:	:	:	:	: :
Date of Registration,	February 5, 1915	. September 10, 1915	. February 5, 1915		. September 15, 1916 February 5, 1915	do.	ф ф	do.	do.	November 16, 1917	. February 5, 1915		. August 31, 1917	Echanger ZZ, 1915	do.	June 7, 1918	. September 10, 1915	. February 5, 1915	do.	. do.	February 12, 1917	. do.
	٠.	•	• •		•	•		•	٠	•	•	•	•	•	•	٠.	•	•	•	•	•	٠.
Post Town.	Hatton	Watawala Dozello	Watawala	9 <del>9</del>	do. Hatton	Watawala	0 0 0 0	Hatton	Watawala	do.	Hatton	allagoar	. Talawakele	trees	Kotacala	Talawakele	Watagoda	. Dolosbage	do.	do	Dolosbace	Nawalapitiya
	• •	•		:	٠			•	٠	•	•	•	:	٠	•		•	•	:		:	: :
Group.			. Carolina	do.	. Comar	1:	. Carolina	1	1		1		ا	ا	11		1	. Barnagalla	. do	Ingurugalla	] [	
	٠.	•	٠.	• •	٠			•	•	•	•	•	•	•	•		•	٠	•	•	•	• •
Name of Estate or Division.	Glengariff Osborne	A berden	Agrawatta	Carolina, No. 1 Do. No. 2	Comer Donnshrook	Hardenhuish	Kadawella	Norton	St. Aubins	St. Heliers	Vellai Oya	VY GLUGHWOLLD	Devon	Mast Holyrood	Mount Vernon	St. Andrews	Yoxford	Allagalla	Barnagalla	Berrewella	Cattaram	Cholunkandie
District.	Dikoya (Upper)	Dikoya (Lower)										i	Olmbula					Dolosbage			•	

May 14, 1015 0,713 Fobruary 5, 1915 0,697 do do. do do. do do.	7 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	March 19, 1915 . 6,705
11.	***************************************	
Gampola Nawalapitiya Dolosbage Undugoda Dolosbage	do. do. do. do. do. do. do. Dolosbage Nolasbage Gampola Dolosbage Gampola Olosbage Odolosbage	Nawalapitiye .
:::::	1::::::::::::::::::::::::::::::::::::::	: :
:	Temeravelly  Temeravelly  Lingurigalla  Kellie  rict).  Mossville  Temeravelly	Tamaraveny
   lawa district).	adugannawa dist	: :
Cooroondoowatta Craighead Dailoaglos Danibagola Dodugalla Donnark (see Pusselawa district	Epplowatie Gallemudena Gangwarity Gonnwarita Hapugalawatia Hayugalawatia Havilland Hillside Inguragala Jak Tree Hill Kolvin Lanten Hill (see Kadugannawa district) Maskeloya Mendegoda Monte Cristo Mosville Monte Cristo Mosville Nartakando Oonankande Oonankande Oonankande Oonankande Sa. Catherine St. Helens St. Helens St. Helens St. Helens	Theydon Bois

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Gazette No.	6,705 do. 6,847 6,697 do.	do. 6,697 do. 6,917 6,697		6,697 do.	
Date of Registration.	. March 19, 1915 do. January 12, 1917 February 5, 1915	do. do. do. December 28, 1917 February 5, 1915		February 5, 1915  do,  do,  do,  do,  do,  do,  July 5, 1918  February 5, 1915  do,  Jonness 1, 1915  February 6, 1915  Go,  Jonness 1, 1917	
Post Town.	Undugoda Aranayaka Dolosbage Aranayaka do	Kandy do do Peradeniya Kandy	deniya gama a gama		
Group.	Tamaravelly	Pallokelle	::::		
Estate ision.	:::::	;;:::		: ::::::::::::::::::::::::::::::::::::	
Namo of Estate or Division.	Ugiesido Weemalle Wevelkelle Windsor Forest Yellangowry	Rajawella Bollagalla (Upper) Morankande Pallagalle Yahalatenne	Beau Sejour Gallinda Pati Rajah Talgaswella	Amblamana Amblamana Augusta Augusta Dunally Galaha Hindugalla Hindugalla Kitoolmoola Mourt Pleasaut Mowtrey	- Service
District.	Dolosbago—contd.	Dumbara Galagedara	Galle	Hantano	

Peradeniya (New)	:		:	Poradoniya	:	Fobruary 5, 1915 6,	5,697
Peradeniya (Old)	:	]	:	do.	:	;	do.
Primrose Hill	:		:	Kandy	:	:	6,890
Prospect Hill	:	į	:	Peradeniya .	:	1915	6,739
Rosawatta	:	1	:	Kandy	:	February 5, 1915 6	6,697
Rosehill (Training Colony)	:	1	:	Peradeniya	:	do	do.
Vedehetta North	:	Dunally	:	Galaha	:	do	do.
Ampititenne	:	i	:	Koslanda	:	December 28, 1917 6	6,917
Ampittiakande	:	1	:	Bandarawela	:	:	6,848
Arnhall	:	1	:	do.	:	. 91	3,697
Ballagalla Ella	:	1	:	do.	:	:	3,890
Batgodde	:	1	:	Haputale	:	:	6,697
Berragalla	:	١	:	do.	:	:	6,705
Blackwood	:	1	:	do.	:	515	6,697
Broughton	:	1	:	Bandarawela	:	:	6,948
Cabragalla	:	Poonagalla	:	do.	:	915	6,697
Catton	:	ďo.	:	do.	:	:	do.
Desculls	:	1	:	Koslanda	:	:	6,713
Dickapittia	:	!	:	Haputale	:	February 5, 195 6,	6,697
Diyalıma	:	Poonagalla	:	Bandarawela	:	do, c	do.
Fellside	:	do.	:	do.	:	do,	do.
Golconda	:	-	:	Haputale	:	:	do.
Haldummulla	:	Needwood	:	Haldummulla.		;	6,713
Haputale	:	1	:	Haputale	:	917	6,851
Idulgashena	:	Needwood	:	Haldummulla	:	:	6,713
Kalupahane	:	1	:	do.	:	:	6,705
Kelburne	:	-	:	Haputale	:	May 4, 1917 6,	6,870
Koslanda	:	1	:	Koslanda.		3, 1917	6,917
Laymastotte	:	Monerakande	:	do.	:	March 19, 1915 6,	6,705
Leangawella	:	1	:	Haputale	:	:	1
Lyegrove (Lower)	:	]	:	do.	:	:	6,697
Lyegrove (Upper)	:	Monerakande Koslanda	:	Koslanda	:	March 19, 1915 6,	6,705

Haputale ...

February 5, 1916 6.697	December 11, 1914	Tallance of the same	reprusty o, 1910	do do do.	do do.	December 11 1914 6	Tobarrana # 101#	represent of 1910 0,097	do do do.	Monoh 0 1017 6 259		•	:	do do do.	do. March 19, 1915 6.705	March 9, 1917	February 6 1918	or of the contract ::	Docomba- 71 1014	December 11, 1914	February 5, 1915	:	914	, op	February 5 1018	·· cordant of total	Mansk 10 101 F	do March 19, 1919 0,705	do. February 5 1918 6 897	March 10 101K	T. T. T. TOTO	July 5, 1918	February 5, 1915	March 19, 1915	7.8 ·	December 17, 1918
Deltota	Galaha	Doltoto	:	Propreconding O	Calaba		Tolfoto	- DOTOG	· :	Elkaduwa		-	:	do	do d	do d	Hunasgiriya Wattegama	: :	Filted		Hunasgiriya Wattegama	· Elkaduwa	.: I	Gampola		1		:	:		Tomore D.	reradeniya	· Gampola	: :	Kaduganna	Gampola
Great Valley	Kirrimettia	Little Valley	Tooloondan		Maddegama (Old)	Moragalla	Oolooswatts	Dottion	r stringsing	Algooltenne	Benyeula (see Matale South).	Dotalla '	Till-dimen	Elkhauwa	Galgawatta	Happawidde	Hunasgiriya (New)	Hunasgiriya (Upper)		Make our	Transport of the second of the	Manatenne	Weygalla	Alpitakande	Ambalawa	Atgalla	Gadadessa	Campolawatta (see Pussellawa).	Gons Adika	Hartfield	Kohbakaduwa	T 0=40=1 TF:13	Verification	Mariawatta	Mount Colville	Mount Temple

Kadugannawa

Hunasgiriya

District.	Name o or Di	Name of Estate or Division.	Ü	Group.		Post Town.	Date of Registration	of tion	Ğ	Gazette
Kadugannawa—contd.	Niyamakanda	;	:	I	:	Kadugannawa July 5, 1918	July 5, 19	į	9:	6,954
	Ranawella	unwa).					1.5		,	100
	Silver Hill	•	:	ł	:	Gampola .	reprusry b, 1915	, 1915	9	6,697
	Sinnonit;	:	:	1	:	Kadugannawa January 12, 1917	. January 1	2, 1917	မာ :	6,847
	Therefore	:	:	I	:	do.	· do		:	do,
Kadusannawa Worth or	Cusparata	:	:	1	:	do.	. do.	•	:	do.
Alagala	Allagele									
	Rolleman	:	:	1	:	do.	March 19, 1915	1915	9	6,705
	Condition	:	:	1	:	do.	. January 12, 1917	2, 1917	9	6.847
	Coorcogaina	:	:	İ	:	do.	. October 22, 1915	1915	9	6.749
	Farm	:	:	ļ	:	do.	. February 5, 1915	1916	9	6,697
	Geragama	•	:	1	:	do.	. August 31, 1917	1917		6.895
	Government Exp	Government Experiment Station	:	1	:	Peradeniva	July 30, 1915	7		6.730
	Kirimittia	:	:	1	:	. Kaducannawa .	February 5, 1915	5, 1915		6.697
	Kituldeniya	;	:	1	:	Peradeniva .	. December 11, 1914	11, 1914		6.687
	Kottegodde	:	:	1			June 18, 1915	916		6 799
	Kurugama	:	:	1	:	do.	do.			<u> </u>
	Lankka	:	:	1	:		. June 1, 1917			6.876
	Nugahena	:	:	İ	:		June 18, 1915	315		792
	Sannha	:	:	I	:	do.	. July 30, 1915	10		6.730
	Seatield	:	Tismoda	apot	:	DAWB	. March 19, 1915	1915		6,705
	Tismode	: ;	:	do,	:	do.	· do.	•		do.
	rangatenna (see Galagedera).	Galagedera).								
Kalutara	Arapolakande	:		ı		Tehnwene	February 6 1915	1915	9	6 607
	Halwatura	:		1	: :	•				8 870
	Neuchâtel			١	:	Nobodo		7101		0,0
3	Rayigam	:	: :	1	: :		Inly 20 1017	17		0,097
Togala	Amblakande	,		ı	:		1 (a fam a		· ·	000
	Debatgama	:		1	: :	· Aranayaka	. Merch 19, 1915	1915	ن <sup>ن</sup> د	6,697

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Kelani Valley

							٠	_		′													
Gazette No.	6,697	6,697 do.	do.	6,697	6,890	6,705	6,713	6,697	do	do	6,705	6,697	6,705	6,697	: do	6,713	180,0	0,749	00/,0	:	:	. do.	op
Date of Registration.	March 19, 1916 February 5, 1916 May 14, 1918	February 5, 1916	do. May 14, 1915	February 5, 1915	August 3, 1917	March 19, 1915	May 14, 1916	February 5, 1915	do.	do.	March 19, 1915	February 5, 1915	March 19, 1915	February 5, 1915	do.	May 14, 1915	reprusry 5, 1915	October 22, 1910	March 19, 1916	do.	 	do.	regulary 6, 1910
Post Town.	Avissawella Puwakpitiya Debiowita		Yatiyantota	Kitulgala	Dehiowita	Avissawella Yativantota	. Rusnwella	. Yatiyantota	do.	do.	Undugoda	Yatiyantota	do.	. Dehiowita	Yatiyantota	do,	до. -	. 000	Avissawella	. Fuwakpitiya	. Kuanwella	do.	Watawala
Group,	Hemingford	Rondura	11		Yogama	Hemingford Sammalkande		:	: !	!	:	1	<ul> <li>Sapumalkande</li> </ul>	· !	:	:   :	· !	•	gord .	Fenrith			Rondura
Name of Estate or Division,	El-Noor Elston Erracht	Ferriby	Ganapalla Glassel	Gonagamma	Hataragalla	Hemingtord Illuktenne	Indurana	Kelani	Kinross	Kiriporuwa	Knavesmire	Lavant	Mahinkanda	Maldeniya	Mipitiyakande	Oaklands	ranawatre	rarusenta	Fatheriya	Fenrith	Figurally	Findeni-oys	Rondura
District.	Kelani Valley-contd.																						

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6,705 do. 6,890 do. 6,697 do. do. 6,705 6,897 6,897	6,739 6,722 6,697 6,749 6,749	do. 6,730 6,697 6,722 6,730 6,697	do. 6,895 6,847 do. 6,697 6,764 6,713
:::::::::::::::::::::::::::::::::::::::	: : : : :	::::::	::::::::
March 19, 1915  do.  August 3, 1917  do.  Fobruary 5, 1916  do.  do.  March 19, 1915  Rebruary 5, 1916  Amerh 19, 1916  Amery 19, 1916  Amery 19, 1916	September 10, 1915. June 18, 1915 February 5, 1916 October 22, 1916 February 5, 1916	do. July 30, 1915 February 5, 1916 June 18, 1915 July 30, 1915 February 5, 1915 Mexic 19 1915	Adusts 31, 1917  January 12, 1917  February 5, 1915  February 5, 1916  May 14, 1915
Watawala Puwakpitya Ruamwala Dehiowita do. Yatiyantota Puwakpitiya Undugoda Dehiowita Asiyantota Dehiowita do.	. Madulkele do. . Wattegama . Madulkele do.	60 60 60 60 60 60 60 60 60 60 60 60 60 6	Rang Madu Rangi Madu
ទូ : : : : : : : : : : : :	: :::::	: : : : : : : : : : : : : : : : : : :	:::::::
Sepumalkando  Yogama  do.  —  Malha-oya  Halgolla  Vocama		Hoolankanda	Tunisgalla Knuckles
		::::::	:::::::
::::::::::::	:::::	::::::	:::::::
Sepurnalkanda Sirisanda Sumyoroft Talapitiya Telampitiya Verulupitiya Waharaka Waharaka We-oya We-oya We-oya Weyweltalawa Weyweltalawa	. Deyanila Galleheria Hatale Kallibokka Madulkele	Mahaousa Nilloomally Poenagalla Relugas Watakelly Allakella	Beddegama Galboda Girindi-ella Goomera Hegalla Kandikettia Katooloya
		j.	
	Kelebokka	Knuckies	

K nuckies conta.		or Division.	dronb.		Post Town.	급	Regi	Registration.	No.	No.	
	Maddakelle Moragahagalla St. John's Hill	::	Knuckles		Madulkele do.		February 5, 191 March 19, 1915	March 19, 1915	::	6,697	
	Tunisgalla	::	Tunisgella		Rangala		July 30, 1915	July 30, 1915	::	6,730	
	w aragalanda	:	:	•	. do	•	Februa	February 5, 1915	:	6,697	
	Acrawatte	:	:	٠	Kotmale	0	:	do.	:	do.	
	Atherton	:	:	•	. Galboda	•	Januar	. January 12, 1917	:	. 6,847	
	Bowhill	:	:	٠	. do.		. Februa	February 5, 1915	:	6,697	
	Dambagalla	:	:	•	. Ulapane		:	do.	:	do.	
	Donside	:	:	•	. Nawalapitiya	pitiya	:	do.	:	do.	
	Doombagastalawa		:	•	. Kotmale		:	do.	:	do.	
	Fettercairn	:	Kadienlena	· Bue	. do.	_	:	do.	:	do.	(
	Gingranoya	:	:	•	· op		. May 14	May 14, 1915	:	6,713	2
	Goorookoya	:	. Goorookoya		Nawalapitiya	oitiya.	· · Februs	February 5, 1915	:	6,697	22
	Greenwood	:	:		· do		:	do.	:	do.	
	Harangalla	:	. Harangalla	•	. Kotmale		:	do.	:	do.	)
	Kadienlena	:	Kadienlena	эпа	. do.	•	:	do.	:	do.	
	Kataboola	:	:	:	. do.		•	do.	:	do.	
	Kolapatana	:	:	:	. do.		•	do.	:	do.	
	Mahasema	:	Kadienlena	ene.	. do.		:	do.	:	do.	
	Oonoogaloya	:	!	•	do		•	do.	:	do.	
	Pitsligo	:	. Kadienlena	•	. do.		:	do.	:	do.	
	Ravenscraig	:	!	•	. Nawalapitiya		:	do.	:	do.	
	Tellisagalla	:	Harangalla	•	. Kotmale		June 18, 1915	8, 1915	:	6.722	
	Tyspane		. Tyspane	:	do.		. Decem	December 17, 1915 6.764	8	6.764	
	Westhall	:	Westhall	:	do.		. Septem	September 10 1915	. 2	6,739	
	:		!	·	:	,	:	I	:	1	
	(See Ratnamura district)	istrict									

Madulelms and Hawsellys Adamstic	Adawatto		I		. Lunuzala	:
	Amblangoda		1	:	do.	. 1916.
	Cocoawatte .		!	:	do.	:
	Deysbrook .	•	1	:	do.	:
	Hopton	•	1	:	do.	1915
	Kehelwatte .	•	1	:	do.	July 20, 1917 6,888
	Kinagoda .	•	1	:	do.	:
	Mahadova (Lower)	•	. Mahadova	:	Madulsima	918
	Park .	•	. Park	Ξ:	Lunugala	1916
	Roeberry .		1	:	Madulsima	June 29, 1917 6,884
	Shawlands .		1	Ξ:	. Lunugala	:
	Swinton .		1	:	do.	, 1915
	Yapame .	•	1	:	do.	May 14, 1915 6,713
	,			•		
Maskellya	Elfindale .	•	١.	:	Watawala	:
	Forres.	•	1	:	Maskeliya	:
	Gallawattie .	•	{	:	Watawala	February 5, 1915 6,697
	Hapugastenna.		1	:	Maskeliya	:
	Lammermoor .	•	1	:	Watawala	February 5, 1915 6,697
	Laxapanagalla .		1	:	do.	:
	Rutherford .		Luccompe	:	Maskeliya	:
	Theberton .	•	l :	:	Watawala	do do.
				•		Mean to 1017 6 959
Matale East and Laggala	Ambena.	•	Nagalia	;	Gammaduwa	:
	Banderapola .		Banderapola Matale	:	Matale	March 19, 1916 6,705
	Cabragalla.		1	:	do.	February 5, 1915 6,697
	Cattaratenne .		1	:	Rattota	:
	Clodagh .	•	l :	:	Matale	:
	Dambulagalla .	•	Pitakanda	:	do.	914
	Dangkanda .		-  -  -  -		. Rattota	916
	Dooroomadella.		Mousakande		Gammaduwa	:
	Dromoland .		!	:	do,	February 5, 1915 5,697

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District		- 11-11-11-11-11-11-11-11-11-11-11-11-11	Name of Estate or Division.	Group.	Post Town.	Date of Registration.	Gazette No.
gala—contd.	and Lag.	Ellagalla Forest Hill Gansaranola	• • • • • • • • • • • • • • • • • • • •		Battota Gammaduwa .	. March 19, 1915 do	. 6,705 . do.
		Godapola	: :	do.	do.	do.	6 6 6
		Hattanwella	:	Brae	Madulkele	. July 30, 1915	6,730
		Kandenewera	:	: !.	Mate	June 18, 1915	8,722
		Karaganatalawa	:	. Banderapola		March 19, 1916	6,705
		Lorganatenne	:	:	Gammaduwa .	February 5, 1915	6,697
		Trensington	:	٠	do.	. March 19, 1915	6,705
		INTERES.	:	. Pitakanda	. Matale	. December 11, 1914	6,687
		Noiscasteny	:	:	Rattota.	. March 9, 1917	6,958
		Lauragaila	:	. Brae	Madulkele	. July 30, 1915	6,730
		Longville	:	:	Rattota	. June 7, 1918	6,948
		Managaila	:	. Brae	do.	. July 30, 1916	6,730
		Midlands	:	:	do.	. do.	do.
		Mousagaila	:	:	. Matale	. March 19, 1915	6,705
		Muandeniya	:	. Banderapola		. do.	. do.
		Nagalla	:	. Nagalla		. March 9, 1917	6,858
		Nicholaoya	:	. Nicholaoya	Rattota	. February 5, 1915	6,697
		Opalgalla	:	. Opalgalla	Gammaduwa	March 19, 1915	6,705
		Owella	:	; 	Matale	July 30, 1915	6,730
		Pallatenne	:	. Opalgalla	Gammaduwa	March 19, 1915	6,705
		Pitakande	:		. Metale	. December 11, 1914	6.687
		Poenagalla (see	Poenagalla (see Kellebokka district)	÷			
		Suduganga	:	1	do.	September 10, 1915.	6.739
		Sylvakanda	:	. Pitakanda .	do,	December 11, 1914	6,687
		Wewelmadde	:		do.	June 18, 1915	6,722
		Wiharegama	:		do.	March 19, 1915	6,705
Matale North	•	Karengalla	:	Nalande	do.	ďo.	do.
		Nalanda	:	. do	do.	do.	do.